National Institute of Environmental Health Sciences

Ecology of Borrelia burgdorferi sensu lato in Europe: Transmission dynamics in multi-host systems, influence of molecular processes and effects of climate change

Author(s): Mannelli A, Bertolotti L, Gern L, Gray J
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Abstract:

The analysis of different multi-host systems suggests that even hosts that are not capable of transmitting Borrelia burgdorferi sensu lato (s.l.) to the tick vector, Ixodes ricinus, or that are secondary reservoirs for these agents contribute to the intensity of transmission and to the overall risk of Lyme borreliosis, through the process of vector augmentation and pathogen amplification. On the other hand, above certain threshold densities, or in the presence of competition with primary reservoir hosts or low attachment rate of ticks to reservoir hosts, incompetent or less competent hosts may reduce transmission through dilution. The transmission of B. burgdorferi s.l. is affected by molecular processes at the tick-host interface including mechanisms for the protection of spirochaetes against the host's immune response. Molecular biology also increasingly provides important identification tools for the study of tick-borne disease agents. Ixodes ricinus and B. burgdorferi s.l. are expanding their geographical range to northern latitudes and to higher altitudes through the effects of climate change on host populations and on tick development, survival and seasonal activity. The integration of quantitative ecology with molecular methodology is central to a better understanding of the factors that determine the main components of Lyme borreliosis eco-epidemiology and should result in more accurate predictions of the effects of climate change on the circulation of pathogens in nature.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Tick-borne Disease

Tick-borne Disease: Lyme Disease

Resource Type: ☑

format or standard characteristic of resource

Review

Timescale: ☑

time period studied

Time Scale Unspecified